






# European Society of Gynaecological Oncology guidelines for the peri-operative management of advanced ovarian cancer patients undergoing debulking surgery

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## ABSTRACT

The European Society of Gynaecological Oncology (ESGO) developed and established for the first time in 2016, and updated in 2020, quality indicators for advanced ovarian cancer surgery to audit and improve clinical practice in Europe and beyond. As a sequela of the continuous effort to improve oncologic care in patients with ovarian cancer, ESGO issued in 2018 a consensus guidance jointly with the European Society of Medical Oncology addressing in a multidisciplinary fashion 20 selected key questions in the management of ovarian cancer, ranging from molecular pathology to palliation in primary and relapse disease. In order to complement the above achievements and consolidate the promoted systemic advances and surgical expertise with adequate peri-operative management, ESGO developed, as the next step, clinically relevant and evidence-based guidelines focusing on key aspects of peri-operative care and management of complications as part of its mission to improve the quality of care for women with advanced ovarian cancer and reduce iatrogenic morbidity. To do so, ESGO nominated an international multidisciplinary development group consisting of practicing clinicians and researchers who have demonstrated leadership and expertise in the care and research of ovarian cancer (18 experts across Europe). To ensure that the guidelines are evidence based, the literature published since 2015, identified from a systematic search, was reviewed and critically appraised. In the absence of any clear scientific evidence, judgment was based on the professional experience and consensus of the development group. The guidelines are thus based on the best available evidence and expert agreement. Prior to publication, the guidelines were reviewed by 117 independent international practitioners in cancer care delivery and patient representatives.

## INTRODUCTION

Surgery for ovarian cancer has evolved considerably over the past decades with increasing implementation of a higher radicality, aiming to achieve maximal tumor clearance even in the most advanced stages of the disease.<sup>1</sup> The European Society of Gynaecological Oncology (ESGO) developed and established for the first time in 2016, and updated in 2020, quality indicators for advanced ovarian cancer surgery to audit and improve clinical practice in

Europe and beyond.<sup>2,3</sup> The aim of ESGO was to homogenize and standardize surgical care through well-defined quality assurance programs and certification processes that would identify centers with the appropriate expertise and excellence to perform this type of radical debulkings without incremental increase of morbidity and mortality.

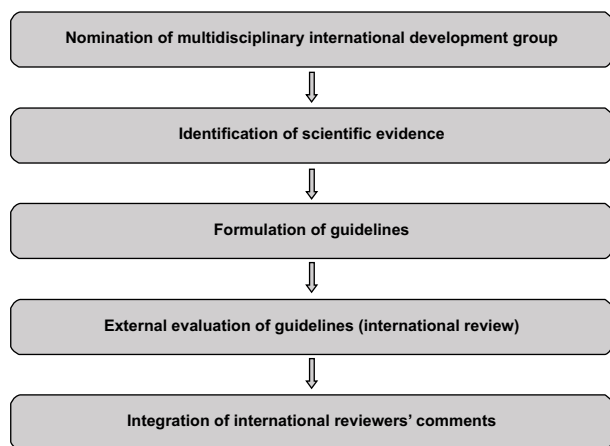
As a sequela of the continuous effort to improve oncologic care in patients with ovarian cancer, ESGO issued in 2018 a consensus guidance jointly with the European Society of Medical Oncology addressing in a multidisciplinary fashion 20 selected key questions in the management of ovarian cancer, ranging from molecular pathology to palliation in primary and relapse disease.<sup>4,5</sup>

In order to complement the above achievements and consolidate the promoted systemic advances and surgical expertise with adequate peri-operative management, ESGO developed as next step, clinically relevant and evidence-based guidelines focusing on key aspects of peri-operative care and management of complications as part of its mission to improve the quality of care for women with advanced ovarian cancer and reduce iatrogenic morbidity. These guidelines are intended for use by all health professionals who are involved in the surgical care of patients with ovarian cancer, across all allied disciplines. Even though our aim was to present the highest standard of evidence in an optimal treatment setting of qualified ovarian cancer centers, ESGO and the working group acknowledge that there will be broad variability in practices between the various centers worldwide and also significant differences in infrastructure, access to medical and surgical technology, and also training, medicolegal, financial, and cultural aspects that will affect the implementation of any treatment guidelines.

## RESPONSIBILITIES

These guidelines are a statement of evidence and consensus of the authors based on their views

## Original research



**Figure 1** Development process.

and perspectives of currently accepted approaches for the peri-operative management of patients with ovarian cancer. Any clinician applying or consulting these guidelines is expected to use independent medical judgment in individual clinical circumstances to determine any patient's care or treatment. These guidelines make no warranties of any kind regarding their content, use, or application, and the authors disclaim any responsibility for their application or use in any way.

## METHODS

The guidelines were developed using a five-step process as defined by the ESGO Guideline Committee standard operative procedures manual (Figure 1). Strengths of the process include a multidisciplinary international development approach as well as a robust external review process consisting of both physicians and patients. This development process involved one pilot, introductory meeting and three 2-day meetings of the international development group, chaired by Professor Christina Fotopoulou (Imperial College London, London, UK).

ESGO nominated practicing clinicians who are involved in the peri-operative management of patients with ovarian cancer and

have demonstrated leadership through their expertise in clinical care and research, their national and international engagement and profile as well as their dedication to the work and vision of ESGO. The objective was to assemble a multidisciplinary panel and it was therefore essential to include professionals from all relevant disciplines—that is, gynecological oncology, anesthesia and intensive care, interventional radiology, microbiology, hematology, nursing, psycho-oncology, and nutrition, to contribute to the validity and acceptability of the guidelines. The list of the development group is available in Online supplemental appendix 1.

To ensure that the statements were evidence based, the current literature was reviewed and critically appraised. A systematic, unbiased literature review of relevant studies published between January 2015 and June 2020 was carried out using the Medline database (Online supplemental appendix 2). The bibliography was also supplemented by additional older relevant references (if any). The literature search was limited to publications in English. Priority was given to high-quality systematic reviews, meta-analyses, and randomized controlled trials, but studies of lower levels of evidence were also evaluated. The search strategy excluded editorials, letters, and in vitro studies. The reference list of each identified article was reviewed for other potentially relevant articles. The development group was also allowed to consider older significant evidence (if any).

The development group developed guidelines for all the topics. The guidelines were retained if they were supported by sufficiently high-level scientific evidence and/or when a large consensus among experts was reached. An adapted version of the 'Infectious Diseases Society of America—United States Public Health Service Grading System' was used to define the level of evidence and grade of recommendation for each of the recommendations<sup>6</sup> (Figure 2). In the absence of any clear scientific evidence, judgment was based on the professional experience and consensus of the development group.

ESGO established a large multidisciplinary panel of practicing clinicians who provide care to patients with ovarian cancer to act as independent expert reviewers for the guidelines developed. These reviewers were selected according to their expertise and active involvement in clinical practice, while geographical balance

| LEVELS OF EVIDENCE        |   |
|---------------------------|---|
| <b>I</b>                  | Evidence from at least one large randomised, controlled trial of good methodological quality (low potential for bias) or meta-analyses of well-conducted, randomised trials without heterogeneity |
| <b>II</b>                 | Small randomised trials or large randomised trials with a suspicion of bias (lower methodological quality) or meta-analyses of such trials or of trials with demonstrated heterogeneity           |
| <b>III</b>                | Prospective cohort studies  |
| <b>IV</b>                 | Retrospective cohort studies or case-control studies  |
| <b>V</b>                  | Studies without control group, case reports, experts opinions   |
| GRADES OF RECOMMENDATIONS |   |
| <b>A</b>                  | Strong evidence for efficacy with a substantial clinical benefit, strongly recommended  |
| <b>B</b>                  | Strong or moderate evidence for efficacy but with a limited clinical benefit, generally recommended   |
| <b>C</b>                  | Insufficient evidence for efficacy or benefit does not outweigh the risk or the disadvantages (adverse events, costs, ...), optional  |
| <b>D</b>                  | Moderate evidence against efficacy or for adverse outcome, generally not recommended  |
| <b>E</b>                  | Strong evidence against efficacy or for adverse outcome, never recommended  |

**Figure 2** Levels of evidence and grades of recommendations.

ensured a global perspective. Patients with ovarian cancer were also included. These independent reviewers were asked to evaluate each recommendation according to its relevance and feasibility in clinical practice (only physicians). Quantitative and qualitative evaluations were performed. Patients were asked to evaluate qualitatively each recommendation. Evaluations of the external reviewers (n=117) were pooled and discussed by the international development group before finalizing the guidelines. The list of the 117 external reviewers is available in Online supplemental appendix 3. This article presents the recommendations with associated levels of evidence and grades. A complete report containing the comprehensive literature review supporting each recommendation is included in supplementary digital content, *IJGC*, available online.

## GENERAL RECOMMENDATIONS

- ▶ All patients should be adequately informed pre-operatively about the risks and benefits of radical ovarian cancer surgery; about the most common complications and their management; and also future steps of their journey (V, A).
- ▶ Early and continuous patient education, information, and coaching within a multidisciplinary approach is advised to holistically support and empower patients (V, A).
- ▶ A risk stratification of patients with ovarian cancer who are planned to undergo debulking surgery should be pre-operatively undertaken to tailor management and proactively act against expected risks (V, A).

## TIMING OF SURGERY IN RELATION TO TARGETED AND ANTIHORMONAL AGENTS

### Bevacizumab

- ▶ A treatment-free interval of at least 28 days between bevacizumab administration and surgery is recommended (III, B).
- ▶ Patients who experience impaired wound healing under anti-angiogenic therapy should discontinue this until the wound has completely healed (III, B).

### Poly(ADP-Ribose) Polymerase (PARP) Inhibitors

- ▶ No specific time interval is defined between elective surgery and discontinuation of oral PARP therapy. A general evaluation of the known side effects and their resolution before surgery is recommended (IV, B).

### Antihormonal Therapy

- ▶ If ovarian cancer progresses with antihormonal therapy, treatment should be stopped at decision to operate to reduce the risk of thromboembolic morbidity (III, B).

## PRE-OPERATIVE BOWEL PREPARATION

- ▶ Mechanical bowel preparation alone is not routinely recommended (I, A).
- ▶ If mechanical bowel preparation is performed, this should be done in combination with oral antibiotics to decrease post-operative complications (II, A).

## SKIN ANTISEPSIS AND HAIR REMOVAL

- ▶ Pre-operative patients bathing or showering with antiseptic solutions such as chlorhexidine gluconate has no benefit in

reducing surgical site infections and is therefore not recommended over a shower or bath with common soap (II, B).

- ▶ Pre-operative hair shaving is not recommended (III, A).
- ▶ Surgical site antiseptics should be performed using 4% chlorhexidine gluconate with alcohol (II, B).

## SURGICAL SAFETY CHECKLISTS, PATIENT POSITIONING AND USE OF RETRACTORS

### Safety Checklists

- ▶ Safety checklists are mandatory in ovarian cancer surgery (III, A).

### Patient Positioning: General Recommendations

- ▶ Safe positioning requires planning and good communication between members of the operating room team and should be checked periodically (V, B).
- ▶ All members of the team should have adequate training in patient positioning (V, B).
- ▶ Intravascular lines, the endotracheal tube, urinary catheter, epidural catheter, and any other devices/equipment should be secured before any movement, and their position and function reassessed after repositioning (V, B).

### Arm Positioning

- ▶ The arms may be positioned either by the side of the patient, or abducted and placed on an arm board. Abduction of more than 90 degrees should be avoided (V, C).

### Surgical Retraction

- ▶ When using self-retaining retractors, the shortest blades possible should be used for adequate retraction without nerve or muscle compression. Rolled laparotomy sponges may be placed between the retractor and abdominal wall to reduce nerve compression, especially in thin patients (V, B).

### Electrothermal Devices

- ▶ Electrosurgical instruments should be checked to ensure that they are safe to use (V, B).

## Anesthesia, Intra-operative and Post-operative Volume and Replacement

### Blood Transfusion and Oncologic Outcome

- ▶ Iron supplementation for correction of anemia should be considered (IV or oral depending on timing, availability, and patient's profile) (III, B).
- ▶ There is no well-defined threshold for blood transfusion in advanced ovarian cancer surgery. Since many patients need chemotherapy, more liberal transfusion thresholds may be used (II, B).
- ▶ Tranexamic acid should be considered peri-operatively to reduce blood loss (I, B).

### Peri-operative Fluid Replacement

- ▶ The use of intravenous albumin should not be considered as a substitute for nutritional support (III, B).
- ▶ Hypoalbuminemia should not be used as a single marker for patient selection for surgery but as guidance for pre-operative optimization of patients (III, B).

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- ▶ Balanced crystalloids should be used for routine fluid replacement (III, B).

### Prevention of Hypothermia

- ▶ Continuous temperature monitoring is recommended. Methods to actively warm patients should be applied (III, B).

### Major Intra-operative and Post-operative Bleeding

- ▶ A multidisciplinary major hemorrhage protocol should be in place in any center performing ovarian cancer surgery. The protocol should be reviewed periodically (IV, B).

### Surgical Options

- ▶ A variety of different local hemostatic agents should be considered and used appropriately according to their mechanism of action and the related potential adverse effects (IV, C).
- ▶ Abdominal and pelvic packing is an effective option in uncontrollable intra-operative bleeding in ovarian cancer debulking surgery (IV, C).
- ▶ A successful abdominal packing should not be removed or replaced before the completion of the first post-operative day. Intervals to remove or replace the pack longer than 3 days increase the risk of infectious complications (IV, B).

### Medical Options

- ▶ Normothermia and the prevention of acidosis are critical to control bleeding effectively. A pH of 7.35–7.45 and a core body temperature of  $>34^{\circ}\text{C}$  should be maintained (III, A).
- ▶ Replacement of combined blood and plasma products as well as pharmacologic agents to support coagulation pathways such as tranexamic acid are recommended in the management of intra-abdominal blood loss in well-defined algorithms (III, A).

### Interventional Radiology Options

- ▶ Interventional radiology techniques, such as percutaneous transcatheter embolization, should be considered as a treatment option in an active arterial bleeding (or a suspected vascular lesion-like pseudoaneurysm) in a stable post-operative patient to avoid relaparotomy (III, B).

## PREVENTION AND MANAGEMENT OF UPPER ABDOMINAL COMPLICATIONS

- ▶ In patients with large-volume ascites and extensive peritoneal and/or lymph node resections, placement of an intra-abdominal drainage could be considered (III, C).

### Liver Resection

- ▶ A gynecological oncology surgeon must be familiar with the anatomy of the liver and the biliary tree and also the various indications and anatomical borders of liver resection techniques (ie, metastasectomy, segmentectomy, and partial hepatectomy) (V, A).

### Biliary Leak

- ▶ First-line treatment for biliary leaks includes conservative management and endoscopic/interventional radiology techniques, depending on the clinical picture of the patient and the extent of the leak (II, B).

- ▶ If sepsis and biliary peritonitis predominate, a percutaneous, ultrasound assisted or surgical drainage should be considered as additional treatment (II, B).

### Spleen, Pancreas

- ▶ There is no value of routine use of prophylactic somatostatin for patients undergoing splenectomy±distal pancreatectomy. Somatostatin analogs, especially its longer lasting derivatives, may be used for selected patients with high-output fistulas (II, C).
- ▶ Pancreatic pseudo abscesses due to pancreatic leak should be managed with percutaneous drains or with an internal endoscopically inserted drain to avoid reoperation (III, B).

### Diaphragm, Pleural Effusion

- ▶ A prophylactic chest tube placement after diaphragmatic surgery is not routinely indicated (III, B).
- ▶ Prophylactic chest tube placement could be considered for those patients with high-volume pre-operative pleura effusion, frailty and hypoalbuminemia, and large/full-thickness diaphragmatic resection (III, B).
- ▶ Small to moderate post-operative pleura effusions, which are not progressive and not associated with respiratory symptoms, should be managed conservatively (III, B).
- ▶ Thoracentesis alone without pleural drain placement is not recommended for the treatment of parapneumonic effusion or empyema (III, B).

### Lesser Sac–Porta Hepatis–Celiac Region

- ▶ If post-operative gastric perforation occurs, reoperation is the mainstay of treatment (III, B).
- ▶ Post-surgical gastroparesis should be addressed with correction of electrolytes, appropriate diet, and pharmacological support, including metoclopramide, domperidone, and erythromycin (III, B).

### Paracardiac Lymph Node Resection

- ▶ Complications like chylothorax after cardiophrenic lymph node resection are rare, and multidisciplinary management is required (V, B).
- ▶ In cases of pericardial opening, no pericardial closure is recommended to avoid tamponade and infection (III, B).

## PREVENTION AND MANAGEMENT OF INFECTIVE AND UROLOGICAL COMPLICATIONS

### Post-operative Sepsis, Collection, Drainage

- ▶ A CT scan is indicated as the best imaging modality in patients with septic symptoms and/or clinical symptoms evoking a collection or abscess after debulking surgery (III, B).
- ▶ Post-operative collections or intra-abdominal abscess should be managed with image-guided percutaneous drainage as the preferred option to avoid relaparotomy (III, B).

### Urological Complications: Hydronephrosis, Ureteric Fistulas, Nephrostomies

- ▶ Use of prophylactic ureteric stents could be considered in patients at high risk for ureteric injury, such as previous urological operations and/or pre-existent hydronephrosis (III, B).

- ▶ Immediate primary repair is recommended for any iatrogenic ureteric injury recognized during surgery (III, B).
- ▶ In the event of complete ureteral transection, immediate reconstruction after mobilization of the ureteric ends and spatulation should be performed. End-to-end anastomosis is usually preferred. Ureteric stent placement is mandatory (III, B).
- ▶ Type of ureteric repair (end-to-end anastomosis vs reimplantation) depends on the distance from the insertion into the urinary bladder (III, B).
- ▶ For iatrogenic ureteral injuries/fistulas diagnosed post-operatively, ureteric stent insertion or urinary diversion via nephrostomy tube is recommended (III, B):  
Internal stenting (with or without dilatation) can be performed either retrograde or antegrade through a percutaneous nephrostomy  
Surgical repair is necessary when conservative management fails.
- ▶ In cases of vesicovaginal fistulas we recommend adequate post-operative bladder drainage and delay of catheter removal until no contrast extravasation on the cystogram is observed 7–21 days after leak/fistula diagnosis (III, B).

#### MANAGEMENT OF BOWEL-RELATED MORBIDITY, PROPHYLACTIC STOMA FORMATION, AND STOMA REVERSAL

##### Prevention and Management of Anastomotic Leak

- ▶ Routinely applied protective stoma formation is not recommended to reduce risk of anastomotic leak in patients with ovarian cancer with colorectal resection (III, B).
- ▶ Post-operative fasting does not prevent anastomotic leak and should not be recommended (III, B).
- ▶ Treatment of patients with a gastrointestinal anastomotic leak should be assessed for conservative treatment with radiological and endoscopic interventional techniques if stable and appropriate. Those patients with extensive peritonitis through bowel content should be managed with reoperation, lavage, and repair and/or diversion (II, B).
- ▶ Endoscopic therapies, including self-expanding metal or covered stents, clips, glue, suturing, (alone or in combination), vacuum-assisted closure systems could be considered as part of the management of a gastrointestinal leak (III, C).
- ▶ Patients without symptoms but with incidentally detected small leaks/fistulas may be managed expectantly with close surveillance (III, C).

##### Stoma Reversal and Care

- ▶ Early versus delayed stoma reversal show comparable outcomes, and timing should be chosen depending on patients-, surgery-, and treatment-related factors (III, B).
- ▶ Support by a dedicated stoma care team is recommended (V, B).

#### ANTIBIOTIC/MICROBIOLOGIC MANAGEMENT AND POST-SPLENECTOMY MANAGEMENT

##### Optimal Timing for Administration of Surgical Antibiotic Prophylaxis

- ▶ Administration of surgical antibiotic prophylaxis is recommended in the 2-hour time window before surgical incision, while considering the half-life of the antibiotic (III, A).

- ▶ Repeat intra-operative dosing of the antibiotic prophylaxis should be performed depending on the half-life of the antibiotic and the duration of the surgery (III, A).

##### Post-operative Routine Surgical Antibiotic Prophylaxis

- ▶ Routine prolonged surgical antibiotic prophylaxis after completion of the operation for the purpose of preventing surgical site infections is not recommended (III, A).
- ▶ In cases of post-operative complications, antibiotic treatment should be considered, depending on patients' clinical picture, biochemistry results, microbiological cultures, and previous treatments (III, B).

##### Post-Splenectomy Management

- ▶ All patients with ovarian cancer post-splenectomy should receive vaccinations against *S. pneumoniae* (pneumococcus), *H. influenzae* type b, and *N. meningitidis* (meningococcus) approximately 2 weeks after surgery (III, A).
- ▶ Annual vaccination against seasonal influenza virus is strongly recommended in post-splenectomy patients (III, A).
- ▶ Patient education regarding higher susceptibility to certain infections is strongly recommended in post-splenectomy patients, along with an emergency antibiotic supply in cases of acute infection (III, A).

#### POST-OPERATIVE PAIN MANAGEMENT

- ▶ A multi-modal approach to post-operative analgesia, including systemic and regional techniques, should be used for ovarian cancer surgery (III, B).
- ▶ There is evidence that epidurals provide benefits in addition to analgesia and these should be considered (I, B).
- ▶ Prolonged use of opioids is not recommended (III, B).

#### PERI-OPERATIVE THROMBOPROPHYLAXIS (PHARMACOLOGICAL AND MECHANICAL) AND MANAGEMENT OF POST-OPERATIVE THROMBOEMBOLIC EVENTS

##### Prophylactic Anticoagulation in Routine Patients without Thrombophilia or Previous Thrombosis

- ▶ Patients undergoing cytoreductive surgery for ovarian cancer, without additional risk factors such as thrombophilia or prior thromboembolic events, should receive prolonged post-operative thromboprophylaxis with low molecular weight heparin at prophylactic doses for 28 days (I, A).
- ▶ Peri-operative mechanical thromboprophylaxis should be considered in addition to pharmacological thromboprophylaxis (IV, B).
- ▶ Post-operative thromboprophylaxis with 2.5 mg apixaban twice daily for up to 28 days after ovarian debulking procedures, could be considered as an equally effective alternative to the traditional thromboprophylaxis with prophylactic doses of low molecular weight heparin in low-risk patients with ovarian cancer (II, A).

##### Management in High-Risk Patients with Previous Venous Thromboembolism Already Receiving Anticoagulation (vitamin K Antagonists, Low Molecular Weight Heparin, Direct Oral Anticoagulants)

- ▶ In patients with venous thromboembolism in the past 3 months, there is a high risk of its recurrence, requiring bridging

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of vitamin K antagonists with heparin/low molecular weight heparin at therapeutic doses (IV, B).

- ▶ In patients with recent venous thromboembolism in the past 3–12 months, there is a moderate risk of its recurrence, allowing bridging of vitamin K antagonists with heparin/low molecular weight heparin at lower than therapeutic doses—for example, at half therapeutic dose (IV, B).
- ▶ Therapeutic doses of low molecular weight heparin should not be resumed sooner than 48 hours after surgery (III, A).

### Management in High-Risk Patients with Previous Venous Thromboembolism not Receiving Anticoagulation any more and in High-Risk Patients with a Thrombophilia but without Previous Venous Thromboembolism

- ▶ Patients undergoing cytoreductive surgery for ovarian cancer with a previous venous thromboembolism who are no longer receiving anticoagulation, and patients with non-severe thrombophilia without previous venous thromboembolism, should receive pre-operative (evening before surgery) and prolonged post-operative thromboprophylaxis for 28 days with low molecular weight heparin at prophylactic doses, similar to routine patients without thrombophilia or previous thrombosis (V, C).
- ▶ Patients with severe thrombophilia and previous venous thromboembolism are already receiving long-term anticoagulation and should be managed with bridging in accordance with the instructions above (V, B).

Bridging in patients receiving anticoagulation and/or antiplatelet drugs due to cardiovascular co-morbidities: atrial fibrillation, biologic or mechanic valve replacement in mitral and aortic position, cardiac stents, and stroke.

- ▶ In patients at high risk for cardiovascular events due, for example, to previous ischemic heart disease, stents, or cerebrovascular disease, who are receiving antiplatelet monotherapy with aspirin and require ovarian cancer surgery, aspirin should be continued peri-operatively and intra-operatively (II, B).
- ▶ In patients at low risk for cardiovascular events who are receiving antiplatelet monotherapy with aspirin, it should be stopped 7 to 10 days before ovarian cancer surgery (III, B).
- ▶ Surgery under dual antiplatelet therapy is not recommended (IV, C).

### Management of Post-operative Venous Thromboembolism Events

- ▶ Initial anticoagulation for cancer-associated venous thromboembolism should be treated with unfractionated heparin or low molecular weight heparin at full therapeutic doses, or rivaroxaban (15 mg twice daily for 3 weeks) or apixaban (10 mg twice daily for 7 days). Low molecular weight heparin is preferred over unfractionated heparin for the initial 5 to 10 days of anticoagulation in patients who do not have severe renal impairment (glomerular filtration rate <30 mL/min) (I, A).
- ▶ Edoxaban (60 mg once daily starting at day 5), or rivaroxaban (15 mg twice daily for 3 weeks followed by 20 mg once daily), or apixaban (10 mg twice daily for 7 days followed by 5 mg twice daily) can be used as a safe alternative to 75–100% therapeutic dose of low molecular weight heparin for prolonged

anticoagulation of patients with cancer-associated venous thromboembolism (I, A).

### Spinal/Epidural Anesthesia and Anticoagulation

- ▶ At least 12 hours should elapse after the last prophylactic dose of low molecular weight heparin before performing a spinal or epidural procedure, or removing an epidural catheter (V, A).
- ▶ Therapeutic doses of low molecular weight heparin should be discontinued at least 24 hours before performing a spinal or epidural procedure, or removing an epidural catheter (V, A).
- ▶ Low-dose aspirin ( $\leq 100$  mg) is not a contraindication for spinal/epidural anesthesia (V, A).

### Indications and Contraindications for Insertion of an Inferior Vena Cava Filter

- ▶ Routine prophylactic pre-operative inferior vena cava filter placement is not recommended in patients at high risk for thrombosis, such as a history of thromboembolism or thrombophilia, apart from specific indications (III, B).
- ▶ Retrievable inferior vena cava filters should be employed as first option over permanent ones, due to equivalent long-term efficacy and additional option of retrieval (IV, B).

### WOUND CONSIDERATIONS/COMPLICATIONS

- ▶ Implementation of an established surgical site infection reduction bundle is recommended to reduce surgical site infection rates (IV, B).
- ▶ In extensive sheeth/subcutaneous mobilization with creation of large dead space and in obese patients, a closed suction drainage and subcutaneous closure may be recommended (IV, C).
- ▶ Meticulous hemostasis at abdominal closure, especially in the subcutis, is strongly recommended to prevent post-operative wound hematomas and seromas (IV, B).
- ▶ A continuous closing technique of a midline fascial incision using a slowly absorbable suture material is the best way for closing the abdomen in the elective setting. The small-bites suture technique seems to be more effective than the traditional large-bites suture technique for the prevention of incisional hernia in the midline incisions (I, B).
- ▶ Negative pressure wound treatment is an option for patients in wound management of peri-operative infections and/or wound breakdown (II, B).

### Surgical Necrotizing Fasciitis

- ▶ Immediate surgical exploration in cases of suspected necrotizing fasciitis is recommended for confirmation of diagnosis, wound debridement, and to obtain cultures for optimal antimicrobiological treatment (IV, B).
- ▶ Initial broad empiric antibiotic therapy that covers both Gram-negative and Gram-positive organisms (eg, vancomycin or linezolid plus piperacillin tazobactam, or carbapenem, or ceftriaxone and metronidazole) is recommended, as the etiology may be polymicrobial (mixed aerobic–anaerobic microbes) (IV, B).
- ▶ Second-look surgery should be considered within 24 hours after the initial debridement. On average, three to four debridements may be needed (IV, C).

**NUTRITIONAL MANAGEMENT**

- ▶ Patients should be screened and assessed for nutritional status with validated nutritional screening tools for malnutrition (III, B).
- ▶ Pre-operative nutritional supplementation should be considered (III, B).
- ▶ Carbohydrate pre-loading prior to surgery is recommended (II, A).
- ▶ Early oral feeding adapted to patients' habits and tolerances is recommended within the first 24 hours after ovarian cancer surgery (II, A).
- ▶ High protein diet/immunonutrition and oral nutritional supplements may be considered in early feeding (III, C).
- ▶ Parenteral nutrition is recommended in malnourished patients in whom enteral nutrition is not feasible or not tolerated, and in patients with post-operative complications, impairing gastrointestinal function rendering them unable to receive and absorb adequate amounts of oral/enteral feeding for at least 7 days (II, A).
- ▶ If oral food intake has been decreased severely for a prolonged period of time, nutritional support should be initiated slowly to prevent refeeding syndrome (III, B).
- ▶ Patients with bowel stoma should receive specialist dietary advice tailored to the type of stoma and length of residual small bowel, to avoid stoma-related complications, such as high/loose output, constipation, blockage, flatulence, and odor (III, B).

**PREHABILITATION, ENHANCED RECOVERY, POST-OPERATIVE ILEUS PREVENTION**

- ▶ Prehabilitation and enhanced recovery programs should be applied as a new and relevant global concept in ovarian cancer surgery (II, A).
- ▶ Trimodal concepts consisting of physical exercise, nutritional assessment and intervention and psychological support, and patients' education are key elements of this program (III, B).
- ▶ The implementation of enhanced recovery after surgery protocols in gynecological oncology is recommended, whereby monitoring of adherence is of fundamental importance (II, A).
- ▶ A multimodal approach, comprising early feeding, goal-directed/balanced fluid therapy, physical activity, opioid-sparing pain therapy, and early mobilization is recommended for the prevention of post-operative ileus (III, B).

**POST-OPERATIVE PHYSIOTHERAPY AND MOBILIZATION**

- ▶ Physiotherapy should be offered as part of routine peri-operative care for women with ovarian cancer (III, B).
- ▶ Early mobilization after surgery is recommended (III, B).

**FRAILTY SCORES/MANAGEMENT OF THE FRAGILE PATIENT**

- ▶ Pre-operative assessment of frailty is recommended to improve tolerability and outcome of any medical and surgical intervention (II, B).

**PSYCHO-ONCOLOGICAL AND SOCIAL SUPPORT**

- ▶ Every woman with ovarian cancer should be screened for distress in a holistic approach as early as possible and should be offered professional psycho-oncological support (III, B).

- ▶ Screening should be repeated at regular intervals during the course of treatment, follow-up, and survivorship programs. For every woman the individual need for psycho-oncological support should be evaluated (IV, B).
- ▶ Besides evaluation by the treating clinician, women should be screened with validated and standardized screening tools such as the National Comprehensive Cancer Network distress thermometer or the Hospital Anxiety and Depression Scale (III, B).
- ▶ Scores that require intervention should be identified in whatever tool is used and women offered psycho-oncological counseling to evaluate distress and psychological/psychiatric co-morbidity (IV, B):  
Women with a low level of distress should be offered patient-oriented information and psychosocial consultation, including creative therapies  
Women with a high level of distress should be offered psycho-oncological interventions (therapy, escort), in addition.
- ▶ Women should be counseled for sequelae of diagnosis and treatment on sexual function and for options of support (IV, B).
- ▶ Survivorship care should support survivors beyond their cancer treatment and regular follow-up care, throughout a lifetime (IV, B).
- ▶ Every patient with cancer should receive an individualized survivorship care plan with information about diagnosis, therapy, possible long-term side effects, recommended check-ups and health promotion as well as psychosocial and psycho-oncological support (III, B).

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